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Peripheral Nerve Blocks for Post-Operative Pain Relief After Arthroscopic Knee Ligament Reconstruction: A Rapid Review

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Conflict of Interest Statement

All authors in the Evidence Development and Standards branch at Health Quality Ontario are impartial. There are no competing interests or conflicts of interest to declare.

Rapid Review Methodology

Rapid reviews are completed in 2–4-week time frames. Clinical questions are developed by the Evidence Development and Standards branch at Health Quality Ontario, in consultation with experts, end users, and/or applicants in the topic area. A systematic literature search is then conducted to identify relevant systematic reviews, health technology assessments, and meta-analyses. The methods prioritize systematic reviews, which, if found, are rated by AMSTAR to determine the methodological quality of the review. If the systematic review has evaluated the included primary studies using the GRADE Working Group criteria (http://www.gradeworkinggroup.org/index.htm), the results are reported and the rapid review process is complete. If the systematic review has not evaluated the primary studies using GRADE, the primary studies in the systematic review are retrieved and the GRADE criteria are applied to 2 outcomes. If no systematic review is found, then RCTs or observational studies are included, and their risk of bias is assessed. All rapid reviews are developed and finalized in consultation with experts.

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Based on the evidence provided by Evidence Development and Standards and its partners, the Ontario Health Technology Advisory Committee—a standing advisory subcommittee of the Health Quality Ontario Board—makes recommendations about the uptake, diffusion, distribution, or removal of health interventions to Ontario's Ministry of Health and Long-Term Care, clinicians, health system leaders, and policy-makers.

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Disclaimer

This rapid review is the work of the Evidence Development and Standards branch at Health Quality Ontario, and is developed from analysis, interpretation, and comparison of published scientific research. It also incorporates, when available, Ontario data and information provided by experts. As this is a rapid review, it may not reflect all the available scientific research and is not intended as an exhaustive analysis. Health Quality Ontario assumes no responsibility for omissions or incomplete analysis resulting from its rapid reviews. In addition, it is possible that other relevant scientific findings may have been reported since completion of the review. This report is current as of the date of the literature search specified in the Research Methods section. Health Quality Ontario makes no representation that the literature search captured every publication that was or could be applicable to the subject matter of the report. This rapid review may be superseded by an updated publication on the same topic. Please check the Health Quality Ontario website for a list of all publications: http://www.hqontario.ca/evidence/publications-and-ohtac-recommendations.

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List of Abbreviations

ACL	Anterior cruciate ligament
AMSTAR	Assessment of Multiple Systematic Reviews
FNB	Femoral nerve block
GRADE	Grading of Recommendations Assessment, Development, and Evaluation
PNB	Peripheral nerve block
RCT	Randomized controlled trial
VAS	Visual Analogue Scale

Background

As legislated in Ontario's *Excellent Care for All Act*, Health Quality Ontario's mandate includes the provision of objective, evidence-informed advice about health care funding mechanisms, incentives, and opportunities to improve quality and efficiency in the health care system. As part of its Quality-Based Procedures (QBP) initiative, Health Quality Ontario works with multidisciplinary expert panels (composed of leading clinicians, scientists, and administrators) to develop evidence-based practice recommendations and define episodes of care for selected disease areas or procedures. Health Quality Ontario's recommendations are intended to inform the Ministry of Health and Long-Term Care's Health System Funding Strategy.

For more information on Health Quality Ontario's Quality-Based Procedures initiative, visit www.hqontario.ca.

Objective of Analysis

The objective of this analysis was to determine the effectiveness of peripheral nerve blocks for post-operative pain relief after arthroscopic knee ligament reconstruction.

Clinical Need and Target Population

Knee ligament reconstruction is a treatment for a tear in the knee ligament that results in instability in the knee. The ligaments of the knee include the medial collateral ligament, the lateral collateral ligament, the anterior cruciate ligament (ACL), and the posterior cruciate ligament. Damage to the ACL is the most common ligamentous problem to present. (1) Knee ligament reconstruction can be a painful procedure and there are multiple modes of analgesia available.

Technique

Peripheral nerve blocks (PNBs) act to block messaging from the nerves that innervate the knee joint and can be used in combination with general anesthesia with the goal of providing superior analgesia than general anesthesia alone.

The blockade of the femoral nerve through a femoral nerve block (FNB) will provide sensory anesthesia of the anterior thigh, knee, and medial aspect of the calf, ankle, and foot. (2) A FNB can be obtained with a single shot of local anesthetic or by using a continuous catheter technique, which may prolong its duration of action. One variation of the FNB is the '3-in-1' block, which uses a single paravascular injection to achieve anesthesia of the lateral femoral cutaneous and obturator nerves as well as the femoral nerve. (2) However, there is some evidence that that there is not much difference between a FNB and '3-in-1' block as the obturator nerve is often not blocked successfully. (3;4) Additional types of PNBs can be used to provide post-operative sensory analgesia to the knee. These can include the blockade of the infrapatellar branch of the saphenous nerve (5), or a combined femoral–sciatic nerve block.

Rapid Review

Research Question

What is the effectiveness of peripheral nerve blocks for post-operative pain relief after arthroscopic knee ligament reconstruction?

Research Methods

Literature Search

Search Strategy

A literature search was performed on April 21, 2014, using Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, and EBM Reviews, for studies published from January 1, 2004, to April 21, 2014. (Appendix 1 provides details of the search strategies.) Abstracts were reviewed by a single reviewer and, for those studies meeting the eligibility criteria, full-text articles were obtained. Reference lists were also examined for any additional relevant studies not identified through the search.

Inclusion Criteria

- English-language full-text publications
- published between January 1, 2004 and April 21, 2014
- systematic reviews, meta-analyses, and health technology assessments
- studies evaluating nerve block given pre- or post-surgery compared with no nerve block

Exclusion Criteria

- studies where relevant data could not be extracted
- conference abstracts

Outcomes of Interest

- pain
- time to discharge

Expert Panel

In December 2013, an Expert Advisory Panel for Patients Undergoing Knee Arthroscopic Surgery was struck. Members of the panel included physicians, personnel from the Ministry of Health and Long-Term Care, health care administrators, and allied health professionals.

The role of the expert advisory panel was to provide advice on primary patient groupings; to review the evidence, guidance, and publications related to defined patient populations; to identify and prioritize interventions for review; and to advise on the development of a care pathway model. The role of panel members was to provide advice on the scope of the project, the methods used, and the findings. However, the statements, conclusions, and views expressed in this report do not necessarily represent the views of the expert panel members.

Quality of Evidence

The Assessment of Multiple Systematic Reviews (AMSTAR) measurement tool was used to assess the methodological quality of systematic reviews. (6)

The quality of the body of evidence for each outcome was examined according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group criteria. (7) The overall quality was determined to be high, moderate, low, or very low using a step-wise, structural methodology.

Study design was the first consideration; the starting assumption was that randomized controlled trials (RCTs) are high quality, whereas observational studies are low quality. Five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias—were then taken into account. Limitations in these areas resulted in downgrading the quality of evidence. Finally, 3 main factors that may raise the quality of evidence were considered: the large magnitude of effect, the dose response gradient, and any residual confounding factors. (7) For more detailed information, please refer to the latest series of GRADE articles. (7)

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	High confidence in the effect estimate—the true effect lies close to the estimate of the effect.
Moderate	Moderate confidence in the effect estimate—the true effect is likely to be close to the estimate of the effect, but may be substantially different.
Low	Low confidence in the effect estimate—the true effect may be substantially different from the estimate of the effect.
Very Low	Very low confidence in the effect estimate—the true effect is likely to be substantially different from the estimate of the effect.

Results of Rapid Review

The database search yielded 9 citations published between January 1, 2004 and April 21, 2014 (duplicates removed). Articles were excluded based on information in the title and abstract. The full texts of potentially relevant articles were obtained for further assessment.

One systematic review was identified that evaluated the efficacy of FNB for post-operative pain relief after ACL reconstruction. (8) No systematic reviews were identified that evaluated the use of other types of nerve blocks in arthroscopic knee ligament reconstruction. The reference list of the included systematic review was hand-searched to identify other relevant studies, and no additional citations were included.

Quality Assessment of Included Systematic Review

The quality of the included systematic review was assessed using the AMSTAR scale and scored 7 out of a possible 11 (Appendix 2, Table A1). The objective of Mall and Wright (8) was to determine whether FNB provides patients undergoing ACL reconstruction greater pain relief or other benefits compared with more standard pain medication regimens. The authors searched PubMed, EMBASE, and the Cochrane Database up to January 2009 and identified 13 RCTs. They concluded that FNBs did not provide additional benefit in terms of patient pain, readiness for discharge, or outcome scores compared with multimodal analgesia. There was no meta-analysis or other qualitative summary of effect estimates presented in the systematic review. The scope of the systematic review was broader than the scope of interest for this rapid review, and therefore the reference list was hand searched to identify studies that met the narrower scope of this review. Four studies (9-12) were excluded as the study protocol included an additional analgesic treatment (e.g., intra-articular injection) in the control group that was not used in the FNB group, and therefore a direct comparison of nerve block with no nerve block could not be made.

Summary of Individual Randomized Controlled Trials Identified by Included Systematic Review

A summary of the 9 studies included from Mall and Wright (8) is presented in Table 1. The studies ranged in sample size from 20 to 233 patients. There was considerable heterogeneity in the implementation of the FNB. In 5 studies, the FNB was inserted pre-operatively (13-17). In the remaining 4, the FNB was inserted post-operatively, (18-21) including 1 in which the FNB placement occurred within the post-anesthesia care unit (21) and another in which the FNB was performed in the recovery room when patients first began to perceive pain. (19) Only 1 study evaluated a continuous nerve block (performed within the post-anesthesia care unit) instead of a single shot of local anesthetic. (21) The remainder used a single injection technique to administer the FNB. Additional analgesia was also used in 5 studies, with both the FNB treatment and placebo groups receiving intra-articular injections pre-operatively. (14;15;17-19) All but 1 study (20) reported data for 1 or both of the pre-specified outcomes of interest for this review (pain and time to discharge). Overall, considerable heterogeneity of the included studies was observed.

Table 1: Randomized Controlled Trials Assessing Femoral Nerve Block With No Femoral Nerve Block Included in Mall and Wright Systematic Review

Author, Year	Anesthesia Type	Sample Size (Intervention/ Control)	Femoral Nerve Block (Intervention)	No Femoral Nerve Block (Control)
Frost et al, 2000 (18)	General anesthesia	29/31	25 mL 0.25% bupivacaine with epinephrine IA + FNB post-operatively (2 mg/kg 0.5% bupivacaine + epinephrine)	25 mL 0.25% bupivacaine with epinephrine IA + FNB NS post-operatively
Harris et al, 1997 (13)	General anesthesia	12/10	FNB pre-operatively (20 mL 0.5% bupivacaine)	Dressing only
Matava et al, 2009 (14)	General anesthesia	31/25	FNB pre-operatively (30 mL 0.5% bupivacaine with epinephrine) + 10 mL injection 0.5% bupivacaine IA + 10 mL injection 0.5% bupivacaine at wound site	2 mL NS subcutaneously + 10 mL injection 0.5% bupivacaine IA + 10 mL injection 0.5% bupivacaine at wound site
Mulroy et al, 2001 (19)	Epidural anesthesia	23+20/12	FNB post-operatively when patients first began to perceive pain (25 mL 0.25% or 0.5% bupivacaine)	Sham block post-operatively
O'Leary et al, 2000 (15)	General anesthesia	16/17	FNB pre-operatively (20 mL 0.5% bupivacaine with epinephrine) + bupivacaine 0.25% at 5 mL/hour infusion + 10 mL 0.5% bupivacaine IA + 10 mL 0.5% bupivacaine peri-incision + 5 mg morphine IA	10 mL 0.5% bupivacaine IA + 10 mL 0.5% bupivacaine peri-incision + 5 mg morphine IA
Peng et al, 1999 (16)	General anesthesia	60/30	FNB pre-operatively (15 mL 0.5% bupivacaine) or FNB (15 mL NS + 1 mL ketorolac IV)	NS FNB and NS IV
Schwarz et al, 1999 (17)	General anesthesia	22/22	3-in-1 (40 mL 0.2% ropivacaine) pre-incision + 20 mL 0.2% ropivacaine infiltration + 30 mL 0.2% ropivacaine IA	NS FNB pre-incision + NS infiltration + 30 mL 0.2% ropivacaine IA
Tierney et al, 1987 (20)	General anesthesia	10/10	FNB at end of surgery (20 mL 0.25% bupivacaine)	NS FNB at end of surgery
Williams et al, 2006 (21)	Spinal anesthetic and multimodal analgesic care plan	76+79/78	Continuous FNB post-operatively in PACU (30 mL 0.25% levobupivacaine) + infusion of NS or levobupivacaine	NS FNB + NS infusion

Abbreviations: FNB, femoral nerve block; IA, intra-articular; IV, intravenous; NS, normal saline solution; PACU, Post-anesthesia care unit.

Pain

Eight studies reported on post-operative pain using a range of various scales (Table 2) and their results are summarized in Table 3. Five studies used the Visual Analogue Scale (VAS), which uses a line usually 10 cm in length bounded by two extremes of the scale. Respondents are asked to place a mark perpendicular to the VAS line at the point that represents their pain intensity.

Table 2: Scales Used to Assess Post-Operative Pain

Scale	Description of Scale	Studies Using Scale
Verbal Related Score	*5-point scale ranging from 0 to 4, assessed verbally* 0 = patients with no post-operative pain 1 = patients with mild post-operative pain 2 = patients with moderate post-operative pain 3 = patients with severe post-operative pain 4 = patients with unbearable post-operative pain	Harris et al, 1997 (13)
Visual Analogue Scale	*Self-rated score ranging from 0 to 10 assessed with a visual scale* 0 = no pain 10 = worst possible pain	Frost et al, 2000 (18) Matava et al, 2009 (14) Mulroy et al, 2001 (19) Peng et al, 1999 (16) Schwarz et al, 1999 (17)
Numeric Rating Scale	*Self-rated score ranging from 0 to 10* 0 = no pain 10 = worst possible pain	Williams et al, 2006 (21)
Non-validated 1–5 scale	*5-point scale ranging from 1 to 5 assessed verbally* 1 = comfortable 2 = mild discomfort 3 = pain 4 = bad pain 5 = very bad pain	O'Leary et al, 2000 (15)
Short-Form McGill Pain Questionnaire	*15 pain descriptor items assessed* 0 = none 1 = mild 2 = moderate 3 = severe	Frost et al, 2000 (18)

Three studies found no significant difference in the pain scores between patients treated with a FNB compared with those treated with no FNB. (14;15;17) Conversely, Williams and colleagues, (21) using a Numeric Rating Scale, reported that the FNB group had significantly lower pain scores when compared with the placebo group on both post-operative days 1 and 2 ($P < 0.001$).

Four studies reported significantly lower pain scores in the FNB treatment groups at specific time points, while no differences were observed at other time points. Harris and colleagues (13) found significantly lower scores at 24 hours post-operation and not at 1, 2, 4, 8, or 12 hours post-operation. Peng and colleagues (16) measured pain scores for up to 3 hours post-operation and reported significantly lower scores in the FNB group only within the first hour after treatment. A third RCT measured pain in the recovery room, on the night of surgery, and post-operative days 1 to 3 using two different pain scales.

They reported a significantly lower pain score in the FNB group using the VAS score only on the night of surgery. (18) However, no difference was observed between the scores when the Short-Form McGill Pain Questionnaire was used. Finally, Mulroy and colleagues (19) reported a significantly lower pain score at 20 minutes after FNB treatment, although this difference was not statistically significant at 40 minutes after treatment. The GRADE for the quality of evidence was evaluated as very low; details are provided in Appendix 2, Table A2.

Table 3: Post-Operative Pain Scores With Femoral Nerve Block Compared With No Femoral Nerve Block

Author, Year	Sample Size	Pain Scale	Summary of Results
Harris et al, 1997 (13)	22	VRS recorded at 1, 2, 4, 8, 12, and 24 hours post-operatively.	VRS score at 24 hours post-operation was significantly lower in FNB group ($P < 0.05$). No statistically significant difference in VRS scores at other time points.
Frost et al, 2000 (18)	60	VAS recorded within recovery room, night of surgery, POD1, POD2, and POD3	The VAS score in patients treated with FNB was significantly lower than placebo only on the night of surgery ($P = 0.011$).
		SF-MPQ recorded within recovery room, night of surgery, POD1, POD2, and POD3.	No significant difference in the pain score on the SF-MPQ between groups.
Matava et al, 2009 (14)	56	VAS recorded at 2, 4, 8, 12, 24, 48, and 72 hours post-operatively.	During the 72-hour post-operative period, there was no significant difference in post-operative pain scores between groups.[a]
Mulroy et al, 2001 (19)	55	VAS recorded at baseline, 20, and 40 minutes post FNB.	VAS scores were not significantly different between the 3 groups before nerve block but were significantly higher ($P = 0.03$) in the sham FNB group 20 minutes after the block.
Peng et al, 1999 (16)	90	VAS recorded at 0, 15, 30, 45, 60, 90, 120, 150, and 180 minutes post-operatively).	In the first hour post-operation, the FNB group had statistically significantly lower VAS scores ($P < 0.05$) than the placebo group. After the first hour, no statistically significant difference in VAS scores was observed.
Schwarz et al, 1999 (17)	44	VAS recorded post-operatively at rest.	No statistically significant difference in VAS scores between groups.[a]
Williams et al, 2006 (21)	233	NRS recorded at POD1 and POD2.	The FNB group had a median pain score of 2 on POD1 and POD2, whereas the placebo group had a median pain score of 4 on POD1 and POD2. On both POD1 and POD2, the FNB group had significantly lower pain scores when compared with the placebo group ($P < 0.001$).
O'Leary et al, 2006 (15)	33	Non-validated 5 point scale recorded at 4, 8, 12, 16, 20, and 24 hours post-operatively.	No statistically significant difference was found on the pain score between the 2 groups ($P = 0.884$).

Abbreviations: FNB, femoral nerve block; NRS, Numeric Rating Scale; POD, post-operative day; SD, standard deviation; SF-MPQ, Short-Form McGill Pain Questionnaire; VAS, Visual Analogue Scale; VRS, Verbal Related Score.

[a]The authors reported only that the difference was not statistically significant; the exact *P* value was not reported in the study.

Time to Discharge

Three studies reported data on time to discharge (Table 4). Peng and colleagues (16) reported on the time needed to reach a post-anesthesia discharge score of 9 as well as the total time in the post-anesthesia care unit. The time spent by patients in the post-anesthesia care unit with a FNB was lower, although this difference was not statistically significant. In another RCT, (17) similar times to discharge from the post-anesthesia care unit and from the hospital were reported for patients with a FNB compared with patients with no FNB. Finally, Matava and colleagues (14) reported a longer time to discharge and total time in hospital in patients with a FNB, although this difference was not statistically significant.

The GRADE for the quality of evidence was evaluated as very low; details are provided in Appendix 2, Table A2.

Table 4: Time to Discharge With Femoral Nerve Block Compared With No Femoral Nerve Block

Author, Year	Sample Size	Outcomes	FNB	No FNB	*P* Value
			Mean (SD)	*Mean (SD)*	*Mean (SD)*
Peng et al, 1999 (16)	90	Time to reach Post-Anesthesia Discharge Score[a] of 9 (minutes)	1045 (512)	1299 (605)	NR[b]
		Time in PACU (minutes)	86 (25)	93 (33)	NR[b]
Schwarz et al, 1999 (17)	44	Time to readiness for discharge from the PACU[c] (minutes)	16.9 (9.7)	19.3 (10.9)	0.44
		Time to discharge from hospital (hours)	23.5 (7.9)	21.5 (3.4)	0.28
Matava et al, 2009 (14)	56	Time from start of surgery until ready for discharge[d] (hours)	12.91 (7.37)	11.67 (7.89)	0.8
		Total time in hospital (hours)	13.18 (7.69)	12.77 (8.34)	0.9

Abbreviations: FNB, Femoral nerve block; PACU, Post-anesthesia care unit; SD, standard deviation.
[a]Post-Anesthesia Discharge Score as defined by Chung (22).
[b]The authors only reported that the difference was not statistically significant and the exact *P* value was not reported in the study.
[c]A patient's readiness for discharge according to the Aldrete score (23).
[d]A patient's readiness for discharge was defined as an Aldrete score ≥18 (23) and the ability to urinate and ambulate.

Conclusions

From the examination of 8 randomized controlled trials identified from 1 systematic review as part of the rapid review:

- Based on very low quality evidence, there were inconsistent results regarding the effectiveness of femoral nerve block for post-operative pain control.
- Based on very low quality evidence, there was no significant difference in the time to functional discharge for patients who received a femoral nerve block compared to those who did not receive a femoral nerve block.

Acknowledgements

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Expert Advisory Panel on Episode of Care for Patients Undergoing Arthroscopic Knee Surgery

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Orthopaedic and Reconstructive Surgery		
Dr Mark MacLeod	Victoria Hospital, London Health Sciences Centre	Orthopaedic Surgery
Dr. Steven Charles Reed	Humber River Regional Hospital	Orthopaedic Surgery
Dr John Semple	Women's College Hospital	Chief of Surgery
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Name	Affiliation(s)	Appointment(s)
Leslie Gauthier	Hamilton Health Sciences	Director, Perioperative Services
Winnie Doyle	St Joseph's Healthcare, Hamilton	VP President Patient Services, Chief Nursing Executive

Appendices

Appendix 1: Literature Search Strategies

Search date: April 21, 2014
Databases searched: All EBM Reviews - Cochrane DSR, ACP Journal Club, DARE, CCTR, CMR, HTA, and NHSEED; All Ovid MEDLINE(R) 1946 to Present.

Q: What is the effectiveness of peripheral nerve blocks for post-operative pain relief after arthroscopic knee ligament reconstruction?
Limits: 2004-current; English; NOT Case reports, Editorials, letters and comments, Conference abstracts.
Filters: health technology assessments, systematic reviews, and meta-analyses.

Database: EBM Reviews - Cochrane Database of Systematic Reviews 2005 to March 2014, EBM Reviews - ACP Journal Club 1991 to April 2014, EBM Reviews - Database of Abstracts of Reviews of Effects 1st Quarter 2014, EBM Reviews - Cochrane Central Register of Controlled Trials January 2014, EBM Reviews - Cochrane Methodology Register 3rd Quarter 2012, EBM Reviews - Health Technology Assessment 1st Quarter 2014, EBM Reviews - NHS Economic Evaluation Database 1st Quarter 2014, All Ovid MEDLINE(R) 1946 to Present.

Search Strategy: Knee Arthroscopy – Nerve Blocks

#	Searches	Results
1	Arthroscopy/	17285
2	exp Knee Joint/ or exp Knee Injuries/	54124
3	and/1-2	6539
4	Anterior Cruciate Ligament/ or Medial Collateral Ligament, Knee/ or Posterior Cruciate Ligament/ or Anterior Cruciate Ligament Reconstruction/	12151
5	(((arthroscop* or reconstruct* or repair* or surg* or orthop*) and (anterior cruciate ligament* or posterior cruciate ligament* or meniscal or menisci or meniscus or menisectom* or semilunar cartilage* or ACL or PCL or MCL)) or (arthroscop* and knee*)).ti,ab.	20163
6	or/3-5	25263
7	exp Anesthesia, Conduction/	60117
8	(canal block* or femoral block* or infrapatellar block* or infra-patellar block* or nerve block* or peripheral block* or chemical neurolys#s or chemodenervation* or chemo-denervation*).ti,ab.	9472
9	(an?esthet* or an?esthesia*).ti,ab.	319416
10	or/7-9	342757
11	Meta Analysis.pt.	47617
12	Meta-Analysis/ or exp Technology Assessment, Biomedical/	56688
13	(meta analy* or metaanaly* or pooled analysis or (systematic* adj2 review*) or published studies or published literature or medline or embase or data synthesis or data extraction or cochrane).ti,ab.	202235
14	((health technolog* or biomedical technolog*) adj2 assess*).ti,ab.	2774
15	or/11-14	218690
16	6 and 10	1613
17	limit 16 to (english language and yr="2004 -Current") [Limit not valid in CDSR,ACP Journal Club,DARE,CCTR,CLCMR; records were retained] EBM Reviews - Cochrane Database of Systematic Reviews <2005 to March 2014> (1) EBM Reviews - ACP Journal Club <1991 to April 2014> (0) EBM Reviews - Database of Abstracts of Reviews of Effects <1st Quarter 2014> (2)	660

	EBM Reviews - Cochrane Central Register of Controlled Trials <January 2014> (221) EBM Reviews - Cochrane Methodology Register <3rd Quarter 2012> (0) EBM Reviews - Health Technology Assessment <1st Quarter 2014> (0) EBM Reviews - NHS Economic Evaluation Database <1st Quarter 2014> (0) All Ovid MEDLINE(R) <1946 to Present> (436)	
18	6 and 10 and 15	18
19	limit 18 to (english language and yr="2004 -Current") [Limit not valid in CDSR,ACP Journal Club,DARE,CCTR,CLCMR; records were retained]	8
20	Case Reports/ or Comment.pt. or Editorial.pt. or Letter.pt. or Congresses.pt.	2895078
21	19 not 20 EBM Reviews - Cochrane Database of Systematic Reviews <2005 to March 2014> (0) EBM Reviews - ACP Journal Club <1991 to April 2014> (0) EBM Reviews - Database of Abstracts of Reviews of Effects <1st Quarter 2014> (2) EBM Reviews - Cochrane Central Register of Controlled Trials <January 2014> (0) EBM Reviews - Cochrane Methodology Register <3rd Quarter 2012> (0) EBM Reviews - Health Technology Assessment <1st Quarter 2014> (0) EBM Reviews - NHS Economic Evaluation Database <1st Quarter 2014> (0) All Ovid MEDLINE(R) <1946 to Present> (6)	8
22	from 17 keep 1-3	3=results from EBM Reviews databases of interest
23	from 21 keep 3-8	6=results from Medline database
24	22 or 23	9

Appendix 2: Evidence Quality Assessment

Table A1: AMSTAR Score of Included Systematic Review

Author, Year	AMSTAR Score[a]	(1) Provided Study Design	(2) Duplicate Study Selection	(3) Broad Literature Search	(4) Considered Status of Publication	(5) Listed Excluded Studies	(6) Provided Characteristics of Studies	(7) Assessed Scientific Quality	(8) Considered Quality in Report	(9) Methods to Combine Appropriate	(10) Assessed Publication Bias	(11) Stated Conflict of Interest
Mall and Wright, 2010 (8)	7	✓	✓	✓	✗	✗	✓	✓	✓	✗[b]	✗	✓

Abbreviation: AMSTAR, Assessment of Multiple Systematic Reviews.

[a]Maximum possible score is 11. Details of AMSTAR score are described in Shea et al. (6)

[b]Did not state that a meta-analysis was not planned or why a meta-analysis was not conducted.

Table A2: GRADE Evidence Profile for the Comparison of Femoral Nerve Block and No Femoral Nerve Block

Number of Studies (Design)	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
Pain							
8 (RCTs)	Very serious limitations (−2)[a]	No serious limitations	No serious limitations	Serious limitations (−1)[b]	Undetected	None	⊕ Very Low
Time to discharge							
3 (RCTs)	Very serious limitations (−2)[a]	No serious limitations	No serious limitations	Serious limitations (−1)[b]	Undetected	None	⊕ Very Low

Abbreviation: RCT, randomized controlled trial.

[a]See risk of bias assessment details provided in Table A3.

[b]Standard deviations are large and studies are potentially underpowered.

Table A3: Risk of Bias Among Randomized Controlled Trials for the Comparison of Femoral Nerve Block With No Femoral Nerve Block

Author, Year	Allocation Concealment	Blinding	Complete Accounting of Patients and Outcome Events	Selective Reporting Bias	Other Limitations
Frost et al, 2000 (18)	Limitations[a]	No limitations	Limitations[b]	No limitations	No limitations
Harris et al, 1997 (13)	Limitations[a]	No limitations	Limitations[c]	No limitations	No limitations
Matava et al, 2009 (14)	No limitations	No limitations	No limitations	No limitations	No limitations
Mulroy et al, 2001 (19)	No limitations	Limitations[d]	No limitations	No limitations	Limitations[e]
O'Leary et al, 2000 (15)	No limitations	Limitations[f]	Limitations[g]	No limitations	No limitations
Peng et al, 1999 (16)	Limitations[a]	No limitations	No limitations	No limitations	No limitations
Schwarz et al, 1999 (17)	Limitations[a]	No limitations	No limitations	No limitations	No limitations
Tierney et al, 1987 (20)	Limitations[a]	No limitations	No limitations	No limitations	No limitations
Williams et al, 2006 (21)	No limitations	No limitations	No limitations	No limitations	No limitations

[a]The process of treatment allocation was not described.
[b]Did not conduct intention to treat analyses accounting for patients lost to follow-up.
[c]Outcome data for one patient was not presented due to premature cessation of treatment.
[d]Patients in the control group may have known that they were in the control group as they did not have a needle introduced or a muscle contraction from the nerve stimulator.
[e]Half of the control patients were excluded from the study and given a nerve block.
[f]The use of blinding in the trial was not described.
[g]Seven patients (18%) had to be removed from the trial due to inappropriate analgesic administration.

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